

WHAT IS CLAIMED IS:

1. A photomask for use in photolithography-based production of a hologram element having a hologram which is divided into a plurality of regions in each of which a diffraction grating is formed, the photomask comprising:

a plurality of mask regions for forming the diffraction gratings of the respective regions of the hologram, the mask regions being composed of a non-light-transmitting mask portion and a light-transmitting portion,

wherein, of the plurality of mask regions, at least two mask regions are configured differently from each other in arrangement interval at which the light-transmitting portions are arranged in an alignment direction, and in ratio of an alignment-direction-wise width for the light-transmitting portions to the alignment-direction-wise arrangement interval for the light-transmitting portions.

2. The photomask of claim 1, wherein the ratio of the alignment-direction-wise width to the alignment-direction-wise arrangement interval for the light-transmitting portions in a mask region having a shorter light-transmitting-portion arrangement interval is made smaller than the ratio of the alignment-direction-wise width to the alignment-direction-wise arrangement interval for the

light-transmitting portions in a mask region having a longer light-transmitting-portion arrangement interval.

3. The photomask of claim 1, wherein, in each of the regions, the ratio of the alignment-direction-wise width to the alignment-direction-wise arrangement interval for the light-transmitting portions is set at 0.5 or below.

4. A method for producing a hologram-element, comprising: performing light exposure by a photolithography method in which the photomask of claim 1 is used, with a light-exposure amount kept in a level where respective hologram regions having diffraction gratings are equal in first-order diffraction efficiency.

5. A method for producing a hologram-element, comprising: performing light exposure by a photolithography method in which the photomask of claim 2 is used, with a light-exposure amount kept in a level where respective hologram regions having diffraction gratings are equal in first-order diffraction efficiency.

6. A method for producing a hologram-element, comprising: performing light exposure by a photolithography method

in which the photomask of claim 3 is used, with a light-exposure amount kept in a level where respective hologram regions having diffraction gratings are equal in first-order diffraction efficiency.

7. A method for producing a hologram-element, comprising:
performing light exposure by a photolithography method in which the photomask of claim 1 is used, with a light-exposure amount kept in a level where a hologram region having a diffraction grating with a shorter grating interval is made larger in first-order diffraction efficiency than a hologram region having a diffraction grating with a longer grating interval.

8. A method for producing a hologram-element, comprising:
performing light exposure by a photolithography method in which the photomask of claim 2 is used, with a light-exposure amount kept in a level where a hologram region having a diffraction grating with a shorter grating interval is made larger in first-order diffraction efficiency than a hologram region having a diffraction grating with a longer grating interval.

9. A method for producing a hologram-element, comprising:

performing light exposure by a photolithography method in which the photomask of claim 3 is used, with a light-exposure amount kept in a level where a hologram region having a diffraction grating with a shorter grating interval is made larger in first-order diffraction efficiency than a hologram region having a diffraction grating with a longer grating interval.

10. A hologram element comprising:

a hologram which is divided into a plurality of regions in each of which a diffraction grating is formed, wherein, of the regions, at least two regions have different diffraction grating intervals and different duty ratios, the duty ratio referring to a ratio of an alignment-direction-wise groove opening width to the grating interval in the diffraction grating.

11. The hologram element of claim 10, wherein a duty ratio of the diffraction grating having the maximum grating interval is set at 0.5 or below, whereas a duty ratio of the diffraction grating having the minimum grating interval is set at 0.5 or above, the duty ratio referring to a ratio of the alignment-direction-wise groove opening width to the grating interval in the diffraction grating.

12. A hologram element comprising:

a hologram which is divided into a plurality of regions in each of which a diffraction grating is formed,

wherein, of the regions, at least two regions differ in diffraction grating interval, but are equal in first-order diffraction efficiency.

13. A hologram element comprising:

a hologram which is divided into a plurality of regions in each of which a diffraction grating is formed,

wherein, of the regions, at least two regions have different diffraction grating intervals,

and wherein the regions of the hologram are equal to each other in first-order diffraction efficiency in a state of being coated with a reflection preventive film.